QTO User Manual

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Introduction to QTO

QTO provides fast and accurate measurement from 2D and 3D drawings. Bills of Quantities can be created directly in QTO or existing Bills of Quantities can be seamlessly updated for progress or final quantities.

Objectives of QTO

- Measure quantities from 2D drawings and 3D BIM models
- Create or update a Bill of Quantities with all the functionality of Candy
- Update quantities after drawing revisions
- Measure for Bill, Final and Progress quantities
- Provide quantities for the BOQ, Valuations, Subcontract Manager and Area bills

Getting Started

Requirements

There are basic requirements to use QTO:

- to have a Bill of Quantities set up in the Candy job
- to have a basic knowledge of Candy
- to understand the principles of measurement

Creating a Bill of Quantities

If there is no existing Bill of Quantities, a BOQ document must be created, copied or imported into the Candy job. QTO will use the BOQ items from this document to create the new Bill of Quantities.

A bill of quantity document can be created by:

- Copying from another Candy job
- Importing from an external file such as Excel or WinQS

It would be preferable to have a Candy job with a BOQ document available in a Candy directory. In this case, **duplicate** the job and **rename**. This job is now ready for QTO.

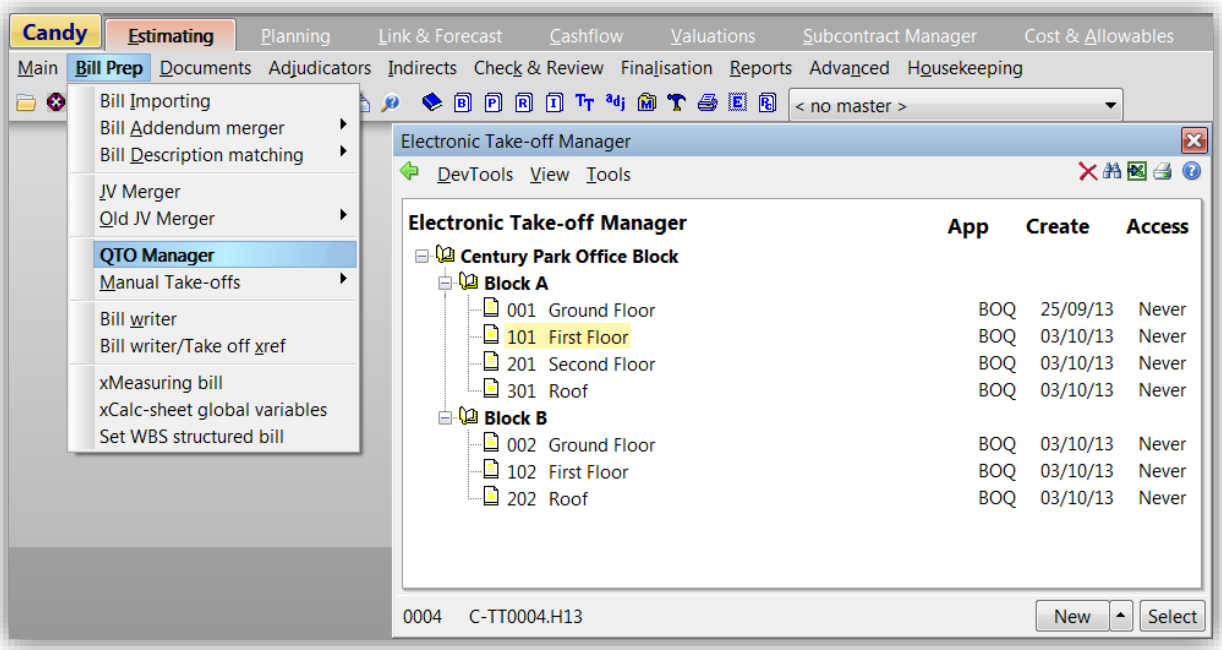
Updating an existing Bill of Quantities

This job is ready for QTO as the Bill of Quantities has already been created.

QTO Manager

QTO Manager is the place where Take-offs are created, stored, renamed, deleted, accessed and where the quantities from the Take-offs are copied back to the Candy Bill of Quantities.

Take-offs should be organised in a structured hierarchy such as below.



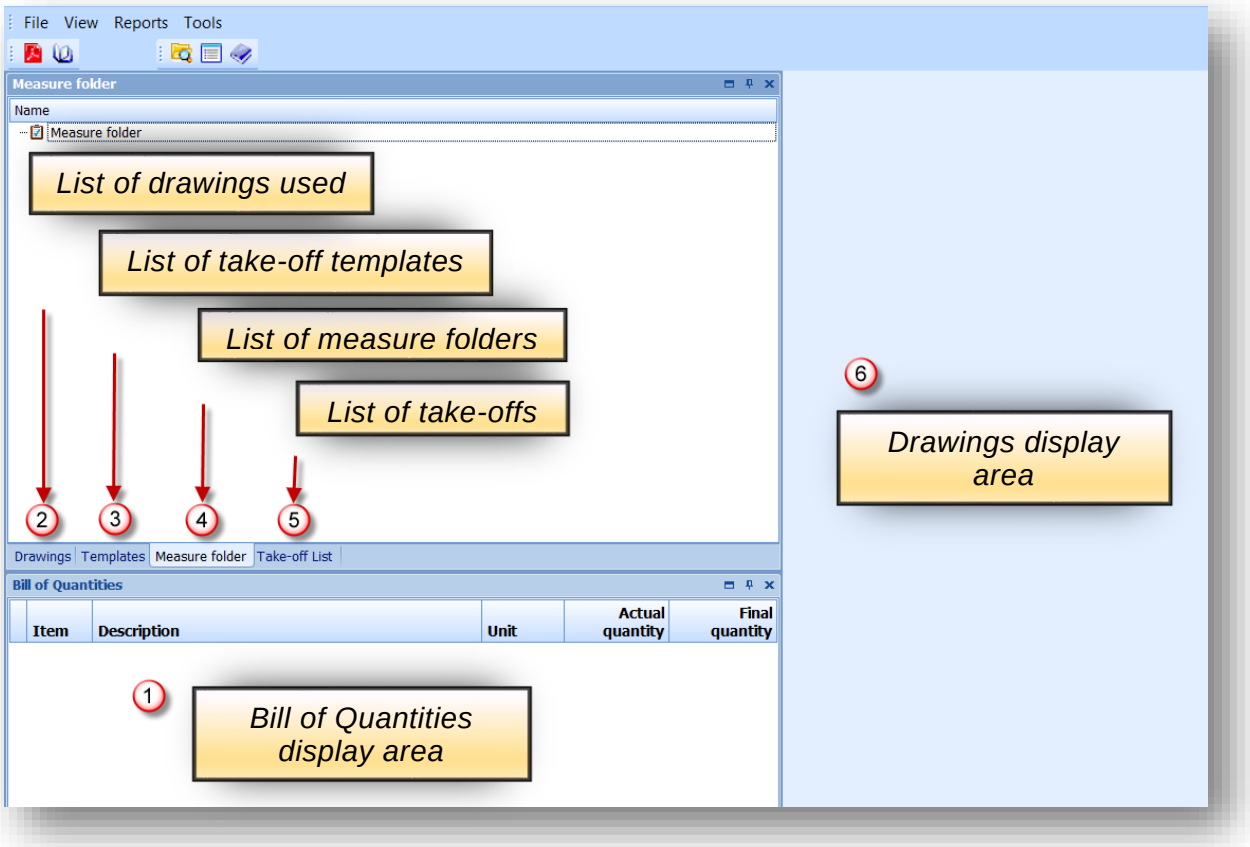
QTO is accessed from Candy by going to **Estimating > Bill Prep > QTO Manager**. To add a new Take-off, use the *New* button in the bottom right corner. Double-click on a Take-off to select it or highlight and use the *Select* button.

QTO Take-offs can be organised under headings and sub-headings. To create a new heading or sub-heading, use the *New* ⇧ button.

QTO Layout

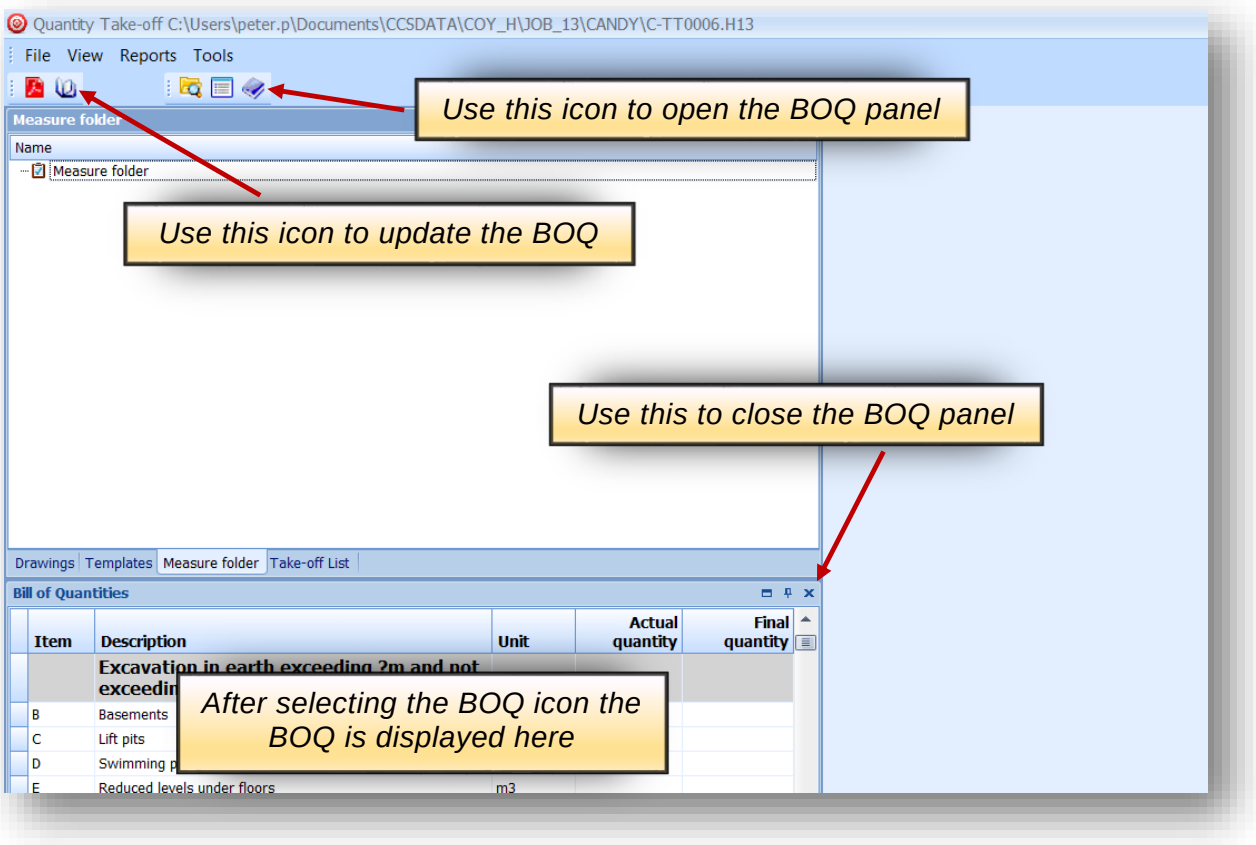
Once the Take-off has been selected, the QTO interface is displayed as shown below. There are six panels available to the QTO interface:

1. The current bill of quantities
2. A list of the drawings to be used in the take-offs
3. Templates of common measurements for re-use
4. A list of Measurement folders
5. A list of take-offs
6. Drawing area



Bill of Quantities

The Bill of Quantities panel is blank when going into a Take-off for the first time. Use the “Bill items” icon to update the QTO Bill of Quantities and to copy from Candy for the first time. The BOQ panel may be closed and made available as required (see below).


Quantity Take-off C:\Users\peter.p\Documents\CCSDATA\COY_H\JOB_13\CANDY\C-TT0006.H13
File View Reports Tools
Use this icon to open the BOQ panel
Measure folder
Name
Measure folder
Use this icon to update the BOQ
Use this to close the BOQ panel
Drawings Templates Measure folder Take-off List
Bill of Quantities
Item Description Unit Actual quantity Final quantity
B Basements
C Lift pits
D Swimming p
E Reduced levels under floors m3
After selecting the BOQ icon the BOQ is displayed here

Adding Bill Items

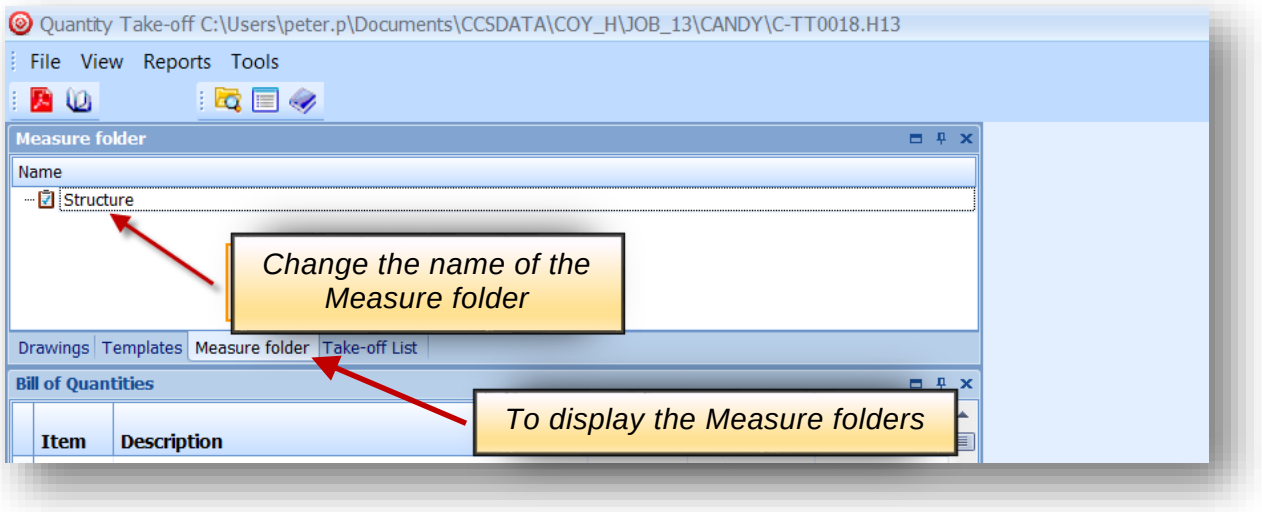
New items have to be created in the Candy bill to be displayed in QTO. Once the items have been created, use the same icon again to update the QTO Bill of Quantities.

Deleting Bill Items

Delete the items in the Candy job, update the QTO bill and the items will be deleted from QTO. All records of the deleted items and any quantities previously measured against them are deleted.

Measure Folders

Measure folders are used to organise take-offs into specific areas or locations. These are clearly referenced when the QTO quantities are transferred to the Candy Bill of Quantities. Measure folders and Sub-folders can be created to your specific requirements. A Measure folder can extend over multiple drawings. To display the Measure folders use the Measure folder tab. Many Measure folders can be created and they will be listed in this panel.



Adding a Folder

To make folders and sub-folders, Right-click in the Measure folder panel at the required position of the folder structure.

Renaming a Folder

The default name for all folders that are created is “Measure folder”, highlight this and rename.

Drawings

Attach a Drawing:

Drawings are added to QTO by selecting the drawing icon and browsing for the correct drawing.

Due to the size of drawing files, they are not saved inside QTO but are attached using the file location. It is strongly suggested, (but not mandatory), that a separate directory be made for all drawings.

File types

QTO accepts drawings in the following file formats - PDF, DXF, DWG, DWF and DWFX.

Opening a Drawing

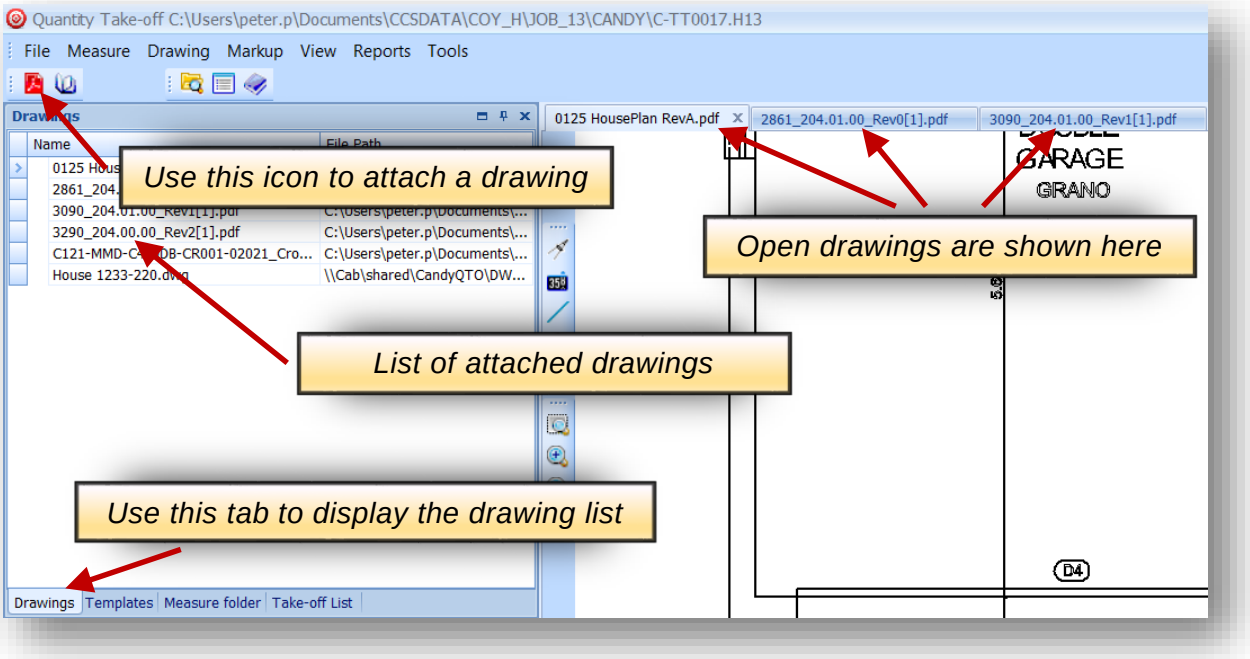
Use the Drawing tab to display the list of attached drawings. To open a drawing right-click on the drawing reference and select *Open* from the menu.

Delete a Drawing

To delete a drawing right-click on the drawing reference and select *Delete* from the menu. Be aware that when a drawing is deleted all take-offs measured from the drawing are also deleted and the bill quantities adjusted accordingly.

Background

Certain 2D drawings are better viewed with a dark background. To switch from the default light background, select the **Drawing** menu on the menu bar, then Background and then select Light or Dark. This option is only available for 2D drawings.

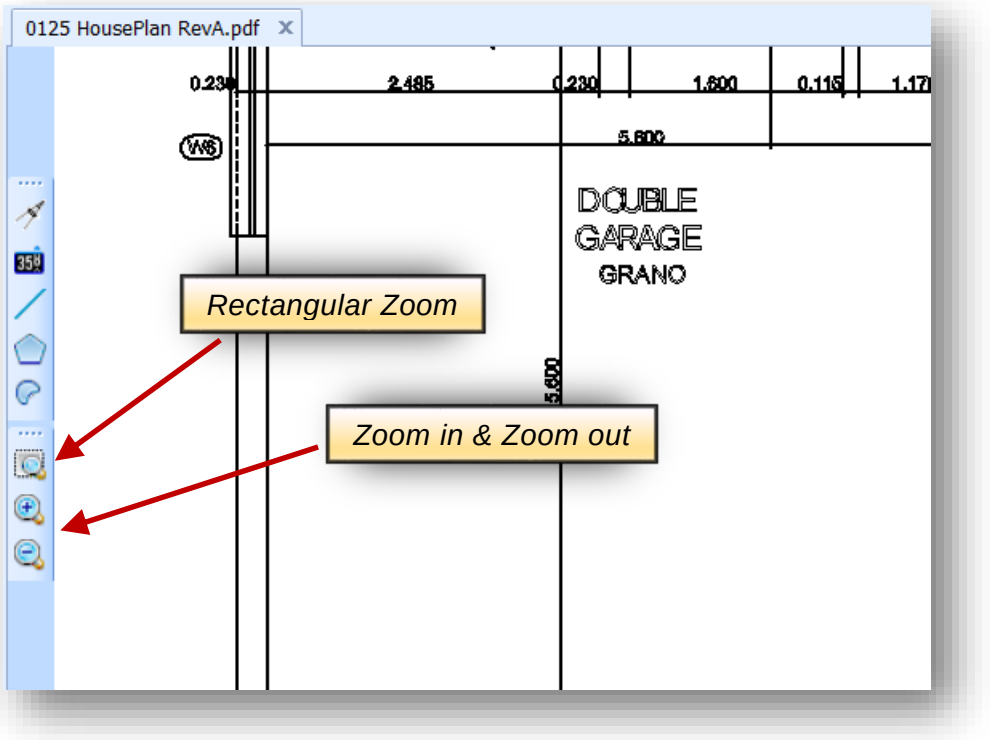


Zooming and Scrolling

The *Rectangular Zoom* tool is a quick way to zoom to a selected area of a drawing. Select this tool and drag to select the required section of the drawing – this will then zoom and display the selected section to fill the drawing screen area.

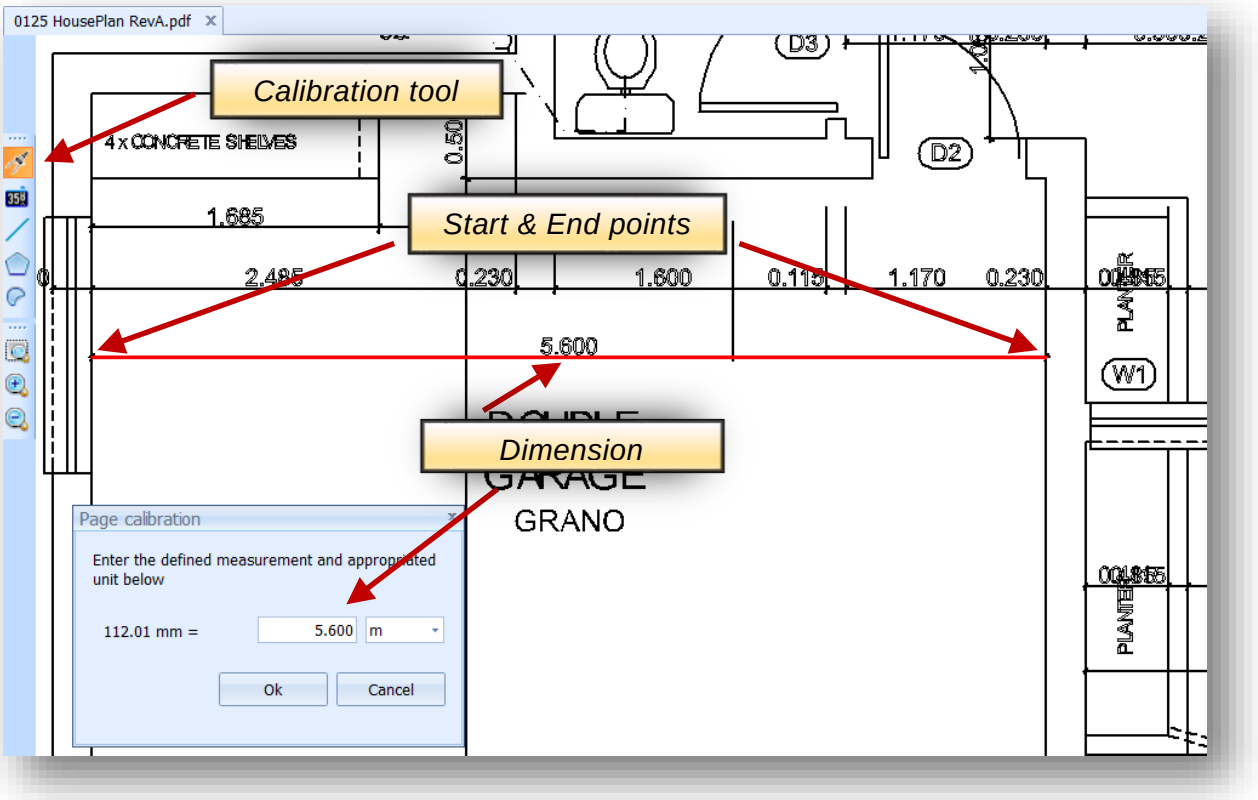
Rolling the mouse wheel or using the *Zoom in* and *Zoom out* tools expand or contract the drawing.

To move the drawing around the drawing panel, push the mouse wheel in and move the mouse around, or use the scroll bars.



Calibrate the Drawing

The scale is unknown in PDF format drawings and has to be calibrated. Select the *Calibration* tool and click on the start point and end point of a known dimension. The dimension must be entered in the dialogue box to establish the scale. A drawing has only to be calibrated once.



2D Measurement Tools

QTO measurement tools are displayed vertically to the left of the drawing panel and contain the tools required for measurement of drawings. These are displayed when a drawing is opened and are different for 2D and 3D drawings.

Number Tool

Use the Number tool to count items such as windows, doors, openings, manholes.

Length Tool

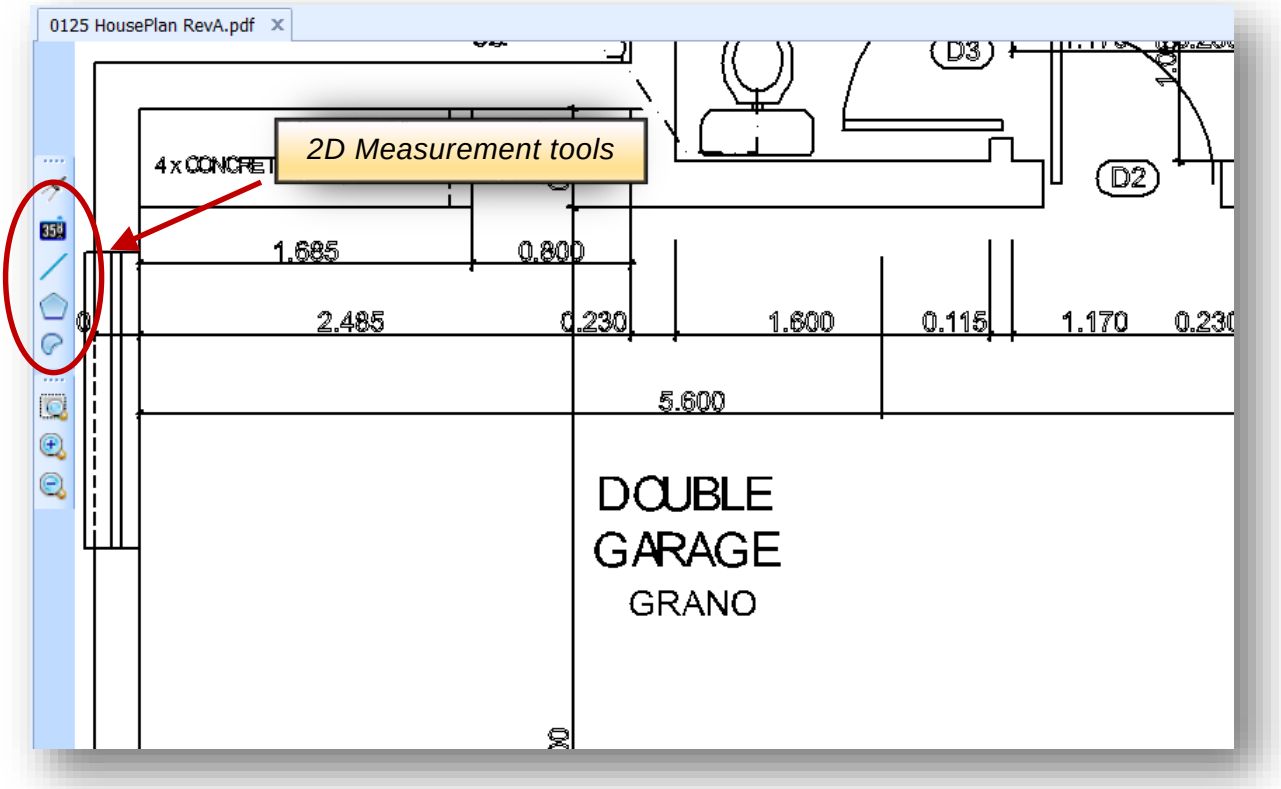
Use the length tool for linear measurements such as drainage trenches, pipework, and perimeter work in general.

Area Tool

Use the Area Tool for measurement of an area.

Arc Tool

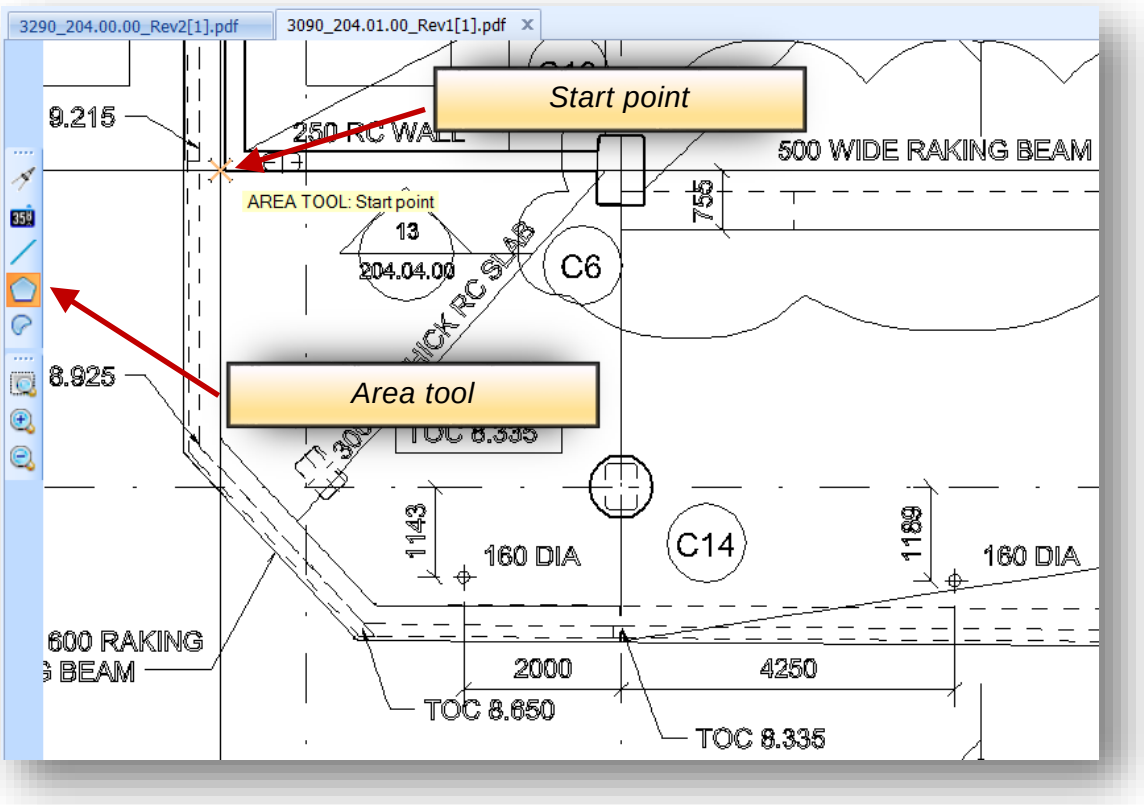
Use the Arc tool for measurement of circular work. Select the start point of the curve, the end point and then any other point on the curve - this will give the length of the arc or circumference and area of the segment or circle.



Measurement

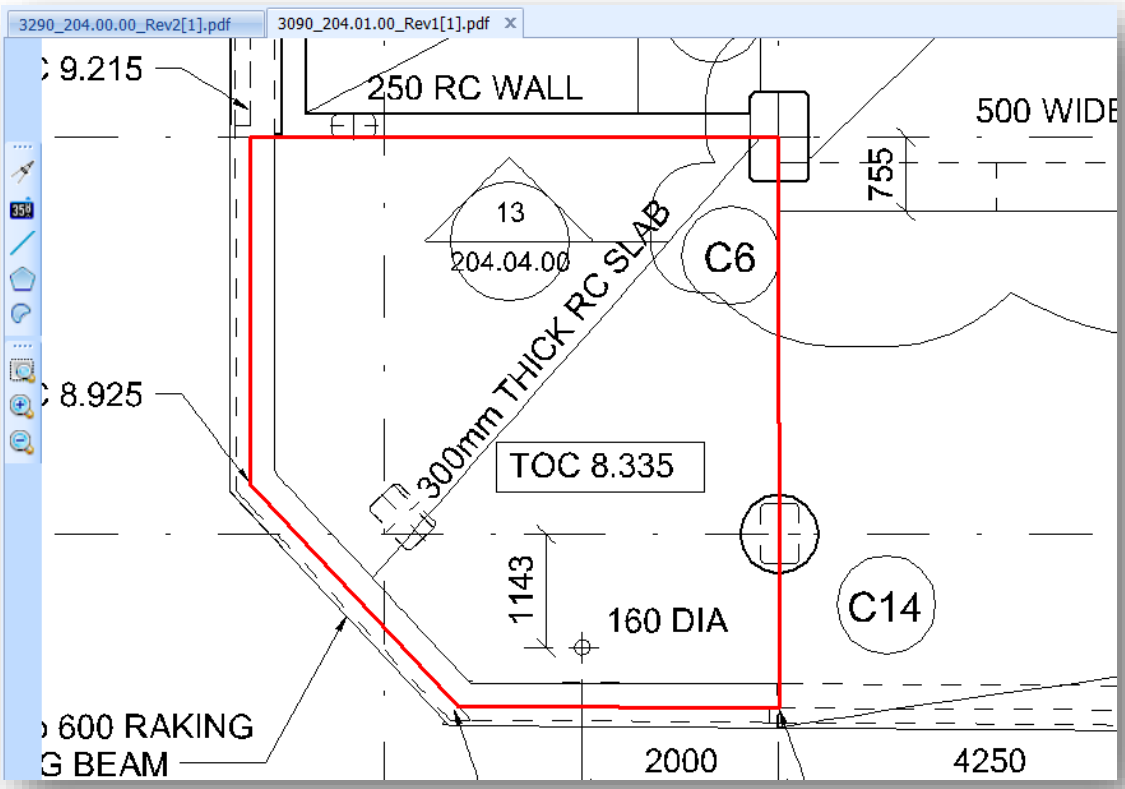
Measuring an area

Select the *Area tool* to start the area measurement. Click on the start point of the area to be measured.



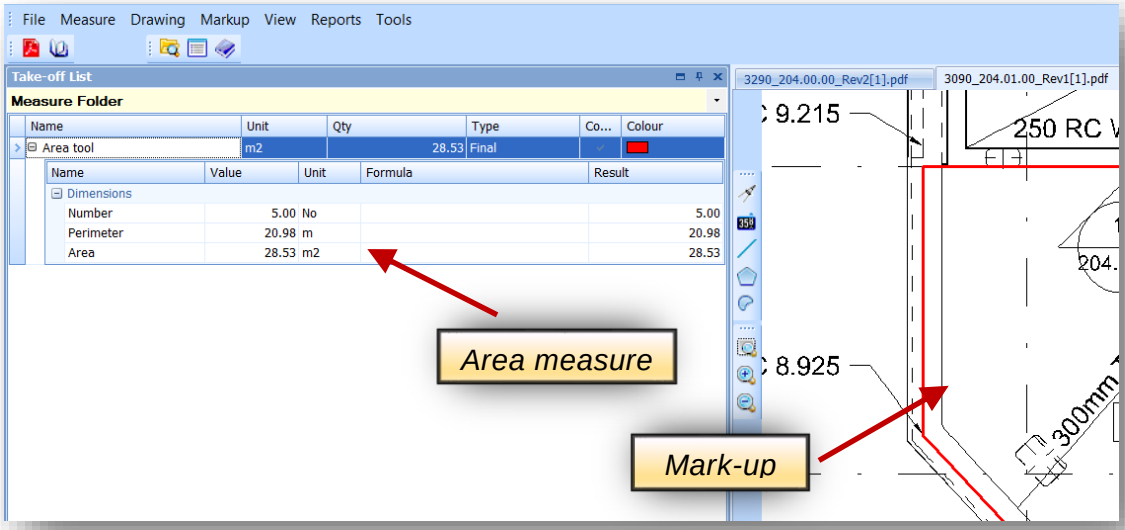
Click successively on each of the points of the area being measured. End the area measurement by right-clicking on the start point (or right-click anywhere and the line will connect to the origin).

The points that are recorded on the drawing are subsequently referred to as “Grip points”



The area measured is shown against the item together with the unit of measure of the tool. The dimensions that are produced by the *Area* tool are the area and perimeter as well as the number of clicks.

The area measured is identified by a red line above known as the “Mark-up”.



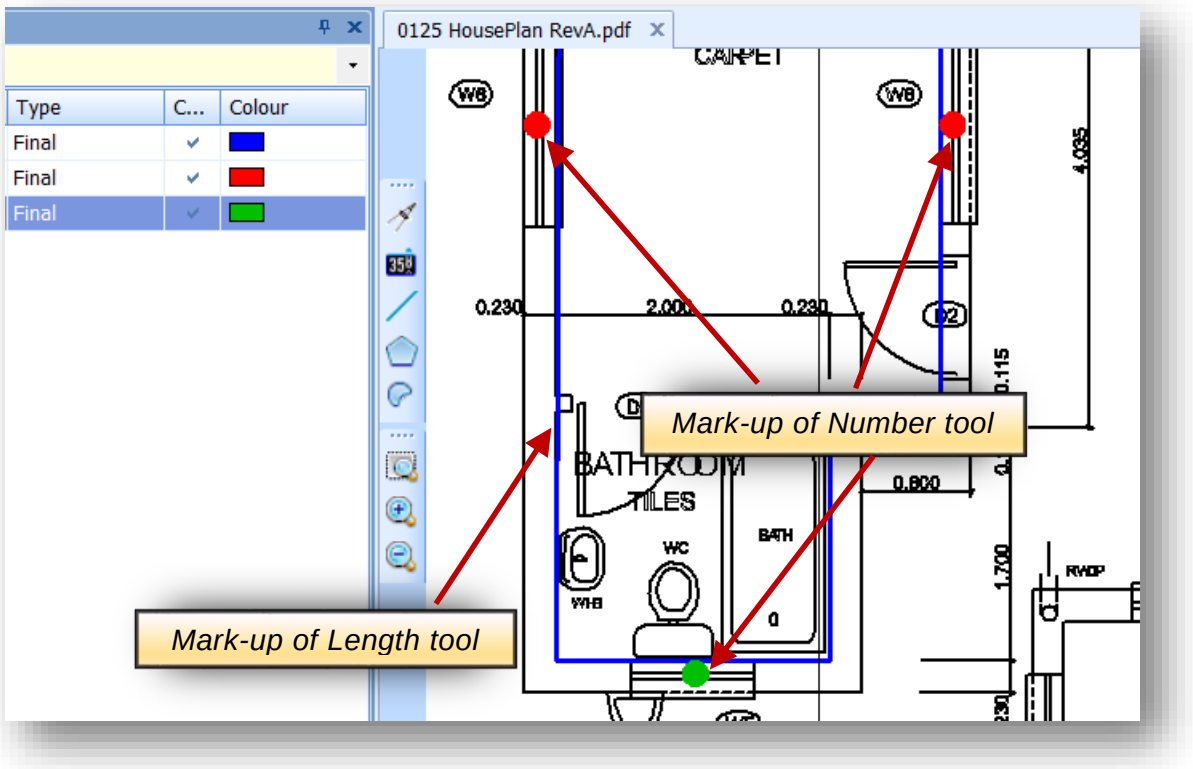
Measuring a length

Select the Length tool to start the linear measurement. Click on the start point of the length to be measured.

Click successively on each of the points of the length being measured. End the length measurement by right-clicking on the last point of the length.

Measuring a Number

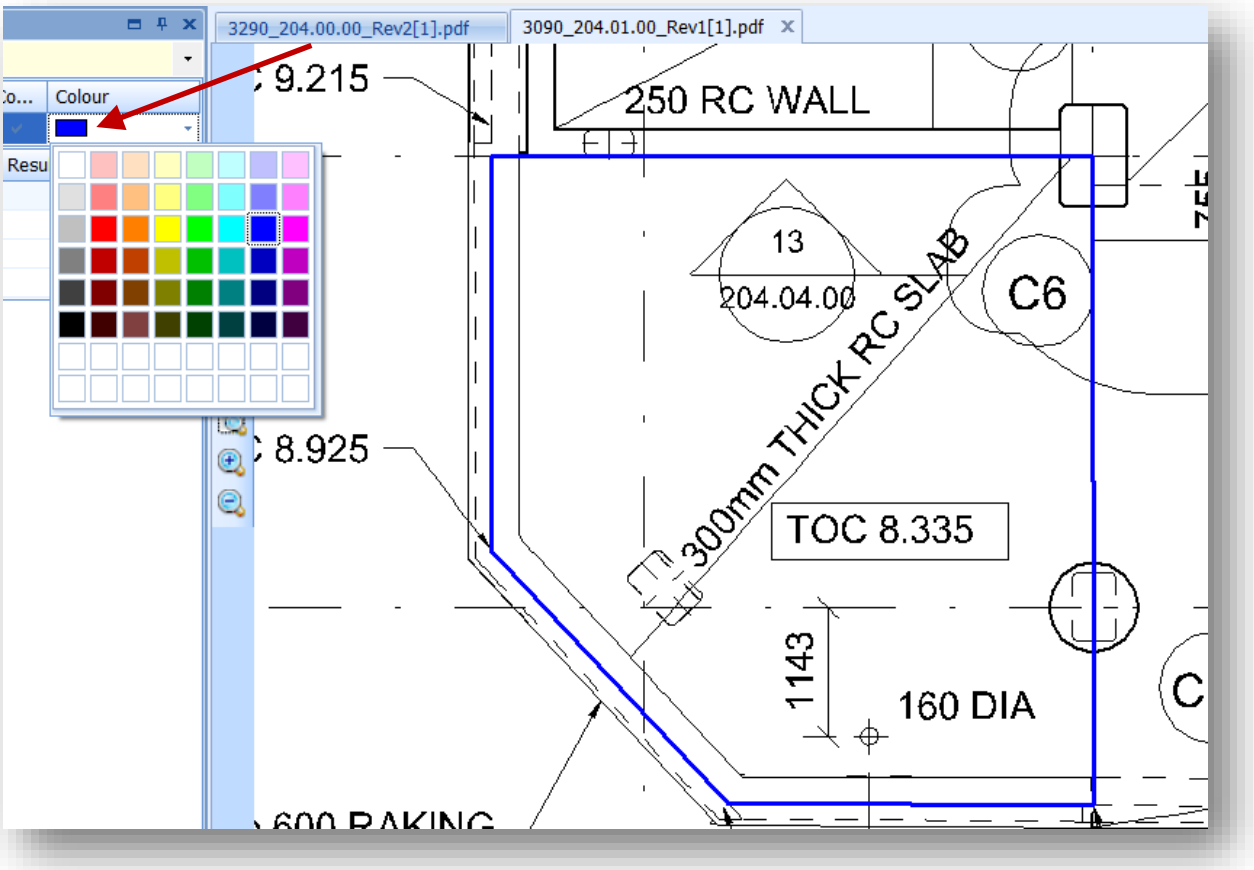
Select the Number tool to start the count. Click on each element that is to be counted and right click on the last element to complete the measurement.



Mark-up

Take-offs are identified on the drawing by using different colours for the “Mark-up”.

The colour of the Mark-up used to represent the measurement is changed by right-click on the colour sample and select a new colour from the colour chart.

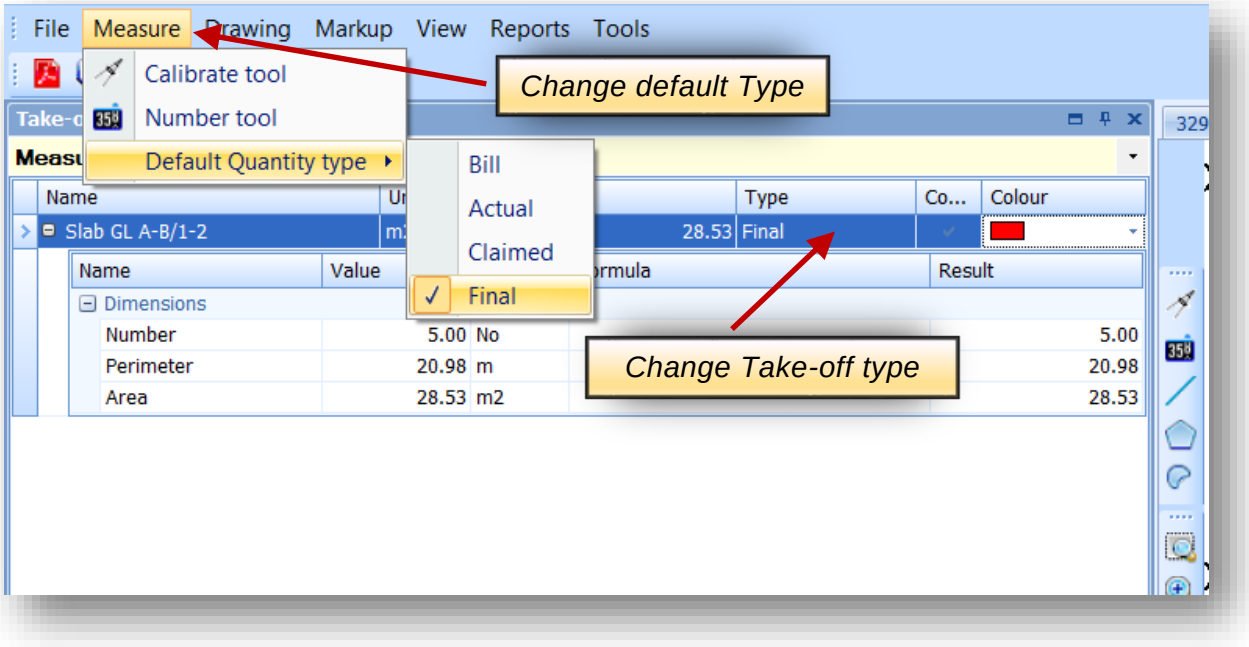


Quantity Type

The Type identifies whether the measure is for Bill, Claimed, Actual or Final Quantities.

To change the default type go to **Measure > Default Quantity type** and change as required.

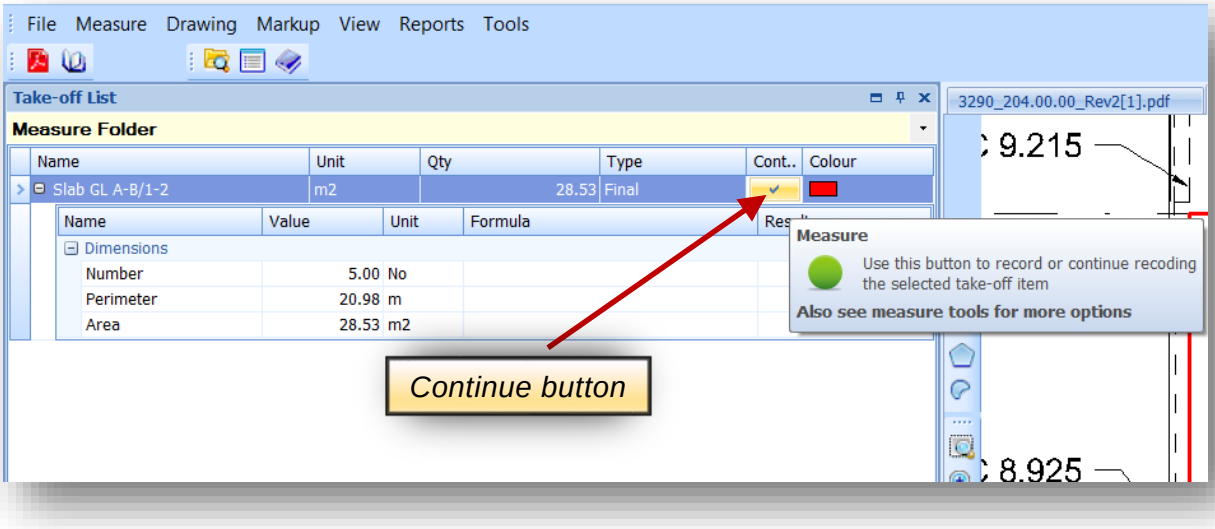
To change the quantity Type for an individual take-off, right-click in the Type field and change as required.



Continue the Take-Off

There will be occasions when a take-off is not completed and has to be continued. Typical examples are when counting columns, windows or doors on a large drawing.

Instead of starting a new take-off each time, select the continue button and continue with the take-off.



Fixing a mistake

Mistakes can easily be rectified in QTO by:

Moving a Grip Point

Position the cursor on the Mark-Up that is to be changed and click to display the Grip Points currently used. Select the Grip Point to be moved and click, position the cursor in the new position and click again, the Grip Point has now been relocated. Double-click to display the revised Mark-Up.

Adding a Grip Point

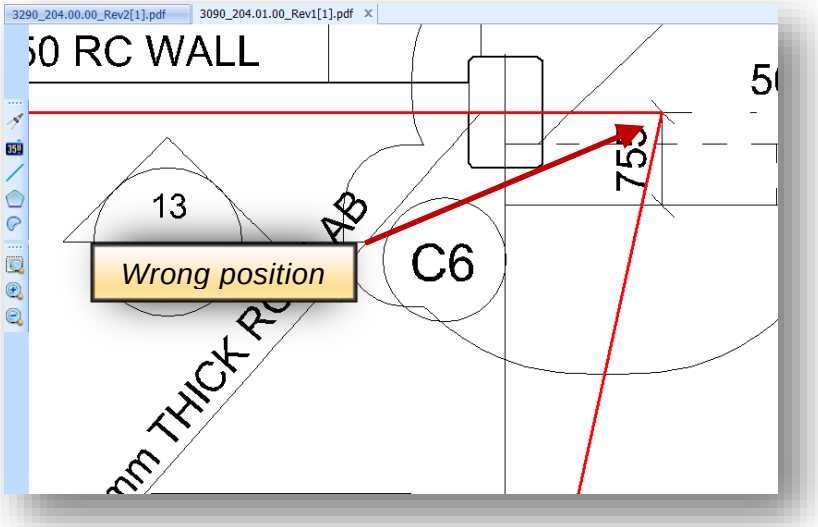
Position the cursor on the Mark-Up where the additional Grip Point is required and right-click to display the dialogue box, select *Add Grip Point*. The additional Grip Point is then added to the Mark-Up, it can then be moved to the correct position by following the steps above under the heading “Moving a Grip Point.”

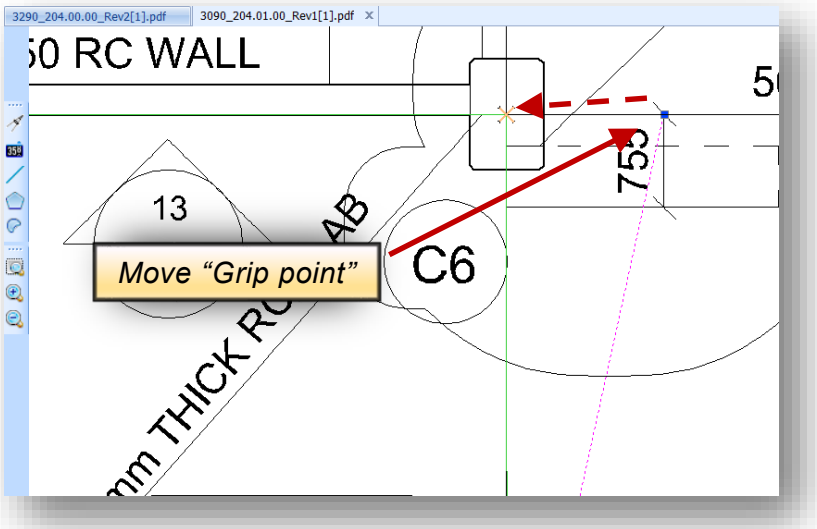
Deleting a Grip Point

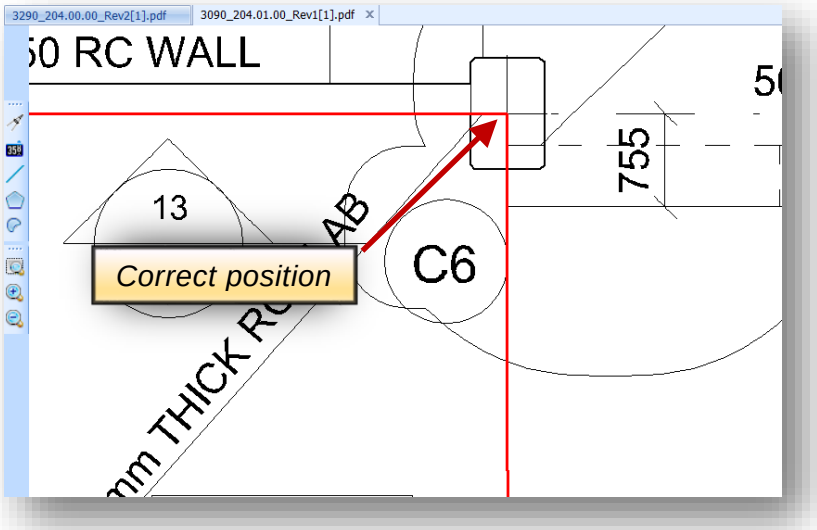
Position the cursor on the Grip Point that must be deleted, right-click to display the dialogue box and select *Delete Grip Point*.

Delete a Mark-Up

Position the cursor on any position of the Mark-Up that needs to be deleted, right-click to display the dialogue box and select *Delete Mark-Up*.


3290_204.00.00_Rev2[1].pdf
3090_204.01.00_Rev1[1].pdf
50 RC WALL
13
Wrong position
C6
755

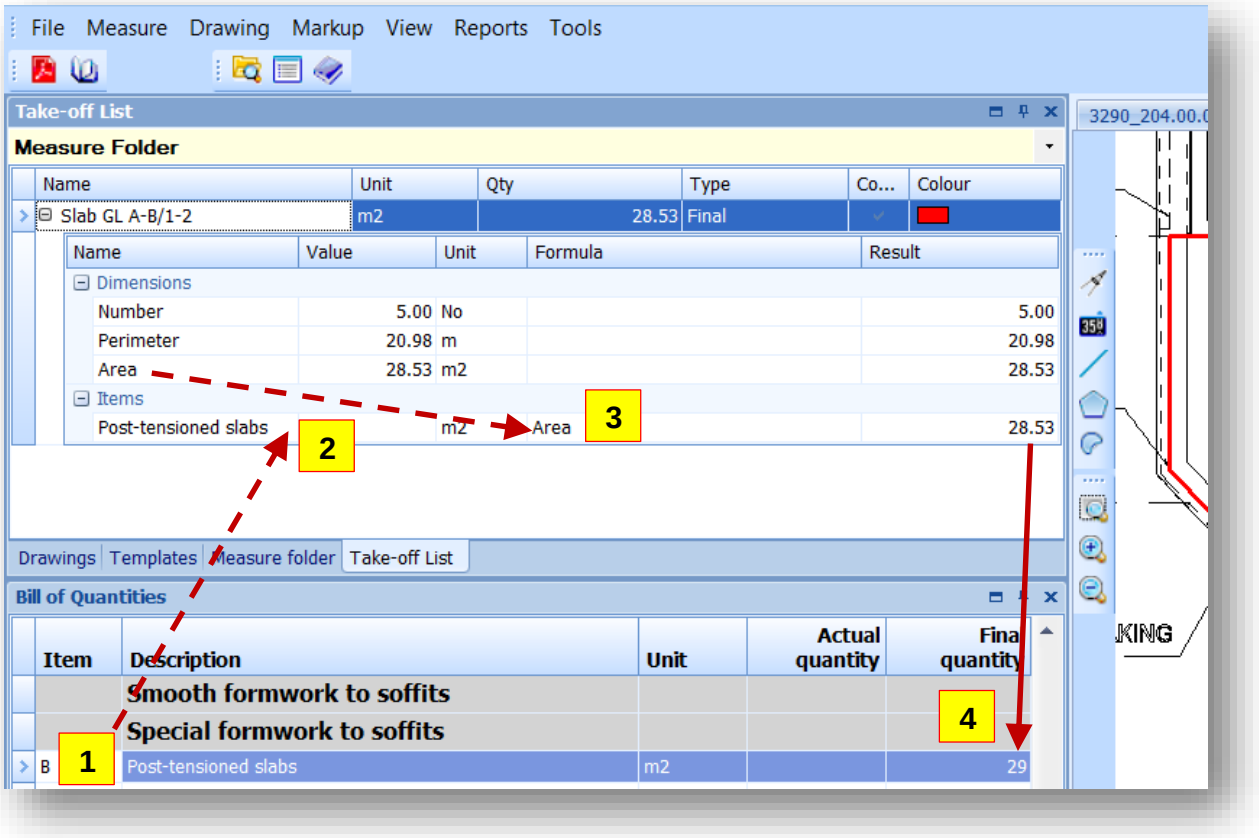

3290_204.00.00_Rev2[1].pdf
3090_204.01.00_Rev1[1].pdf
50 RC WALL
13
Move “Grip point”
C6
755


3290_204.00.00_Rev2[1].pdf
3090_204.01.00_Rev1[1].pdf
50 RC WALL
13
Correct position
C6
755

Attaching Bill Items to the Measure

The next step is to use the measured dimensions to create quantities in the bill. The Bill of Quantities needs to be displayed so that bill items can be dragged onto the take-off.

Double-click on the Bill of Quantities tab and the bill will float free. Position it at a convenient place – much easier when using multiple screens.



Select a bill item[1] that uses these dimensions to calculate its quantity and drag it onto the take-off item[2].

Drag the word *"Area"* into the formula field of the formwork item[3].

This calculates the formula to arrive at the quantity which is displayed against the bill item in the take-off. Note that the quantity has also been recorded in the QTO Bill of Quantities below[4].

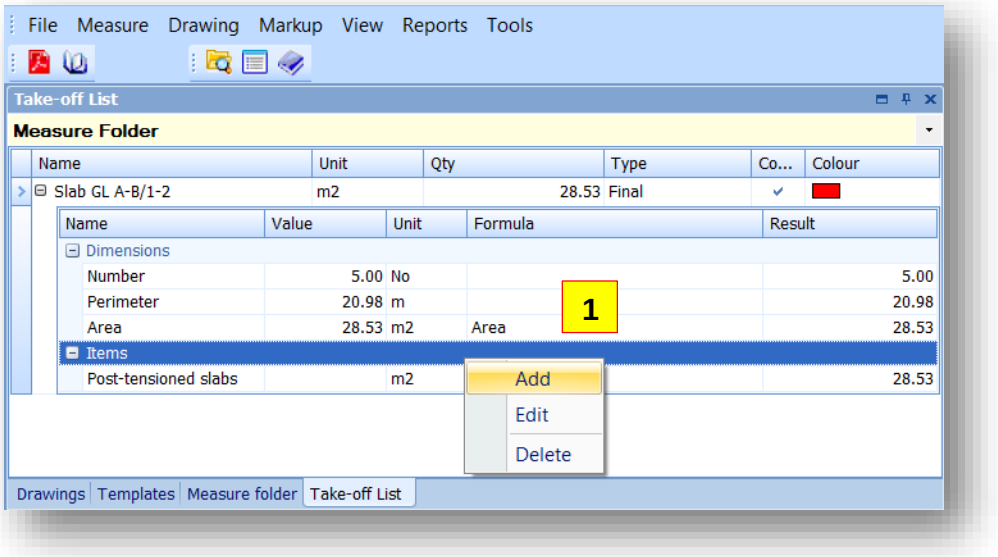
Variables

The above example was simple as only the area was required.

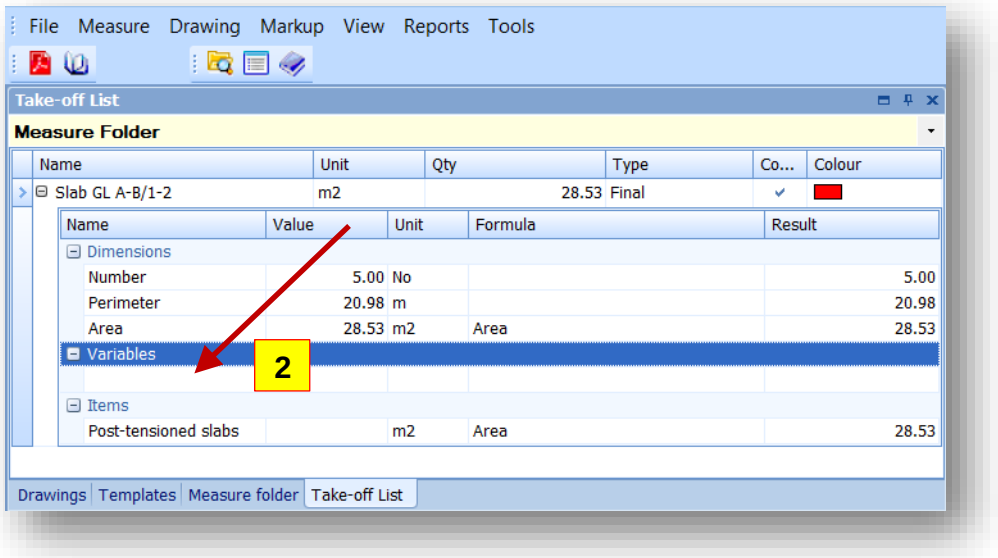
Variables will be required in the measurement to calculate the correct quantity for multiple Bill items using one take-off measurement. The internal area of a building will give the area of the floor and ceiling but would need a variable (thickness) to calculate the volume of concrete in the surface bed and in this example the thickness of the slab is required to calculate the volume of concrete.

Creating a Variable

Right Click in the measurement area displays the drop down box and select **Add**[1].



This now extends the measurement area to include the Heading Variables, open up the Variables Heading and the first blank variable is displayed[2].



Enter "*SlabT"* in the name field, "*0.3*" in the value field and "*m*" in the unit field.

Properties

A variable is made up of five fields:

Name:

This is the reference which identifies the variable from others in the take-off, it can be as brief as H (for height) or T (for thickness), the reference is user defined and will be used in formulae (explained below).

Value:

The variable may have a simple value or the value may be derived from a formula (explained below). A simple value is entered in this cell.

Unit:

For reference purposes the unit type is entered here.

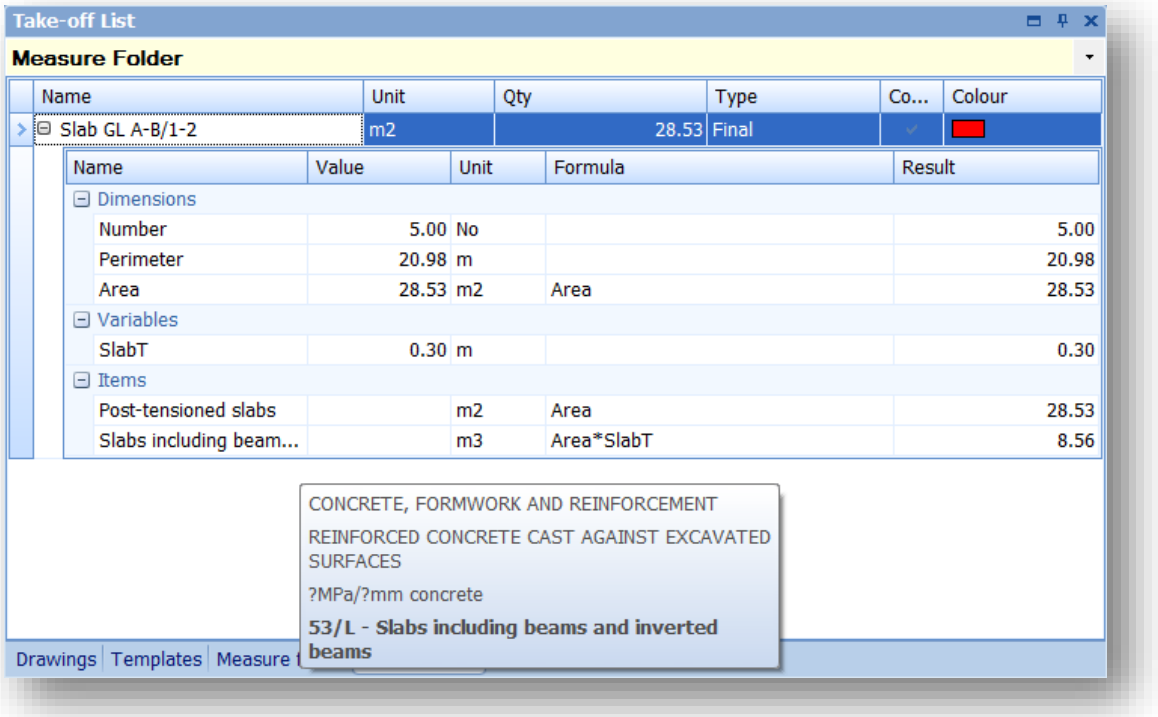
Formula

When a formula is used to calculate the variable value the formula is entered here. Formulae can use Dimension names, Variables and support mathematical functions such as sine, cosine and tangent. Only variables above the variable being entered can be used in the formula.

Drag the concrete item onto the take-off, drag the word *"Area"* into the formula field, then drag the variable *"SlabT"* onto the formula field. When the variable *"SlabT"* is dropped in the formula field you are given a choice of operator to place between it and Area, select *.The result will be recorded in the result field and the Bill of Quantities will be updated.

The formula can also be typed in, but it is quicker to drag Dimension names and Variables into the formula.

It is also possible to Copy and Paste formula from a variable previously entered which can then be revised.

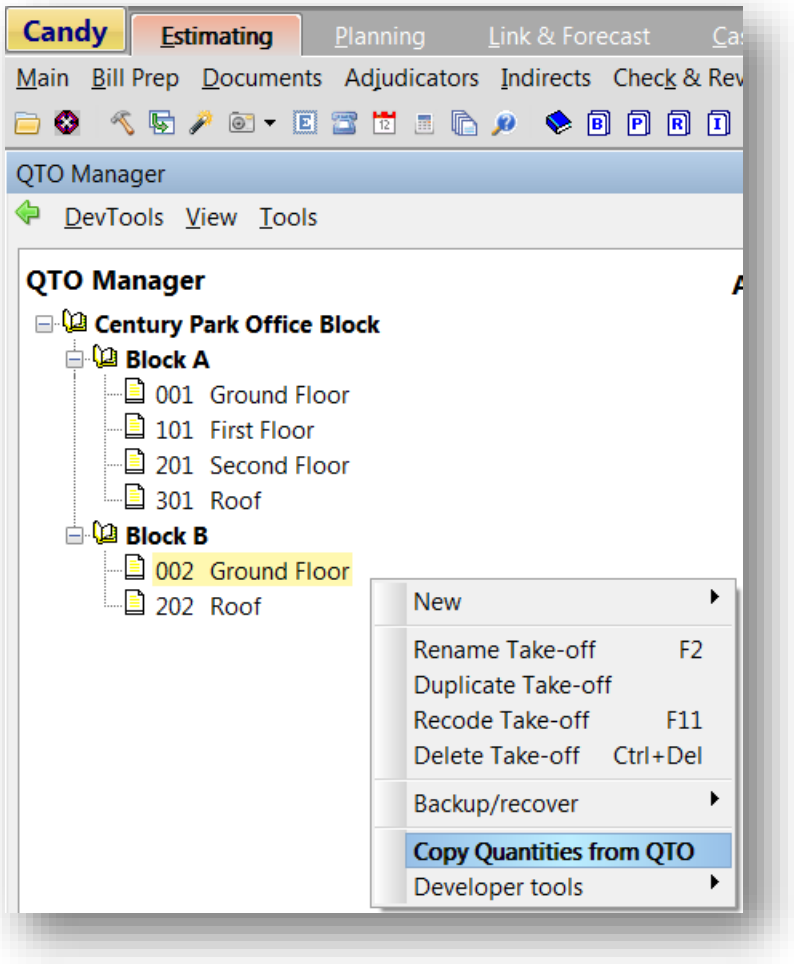


Result:

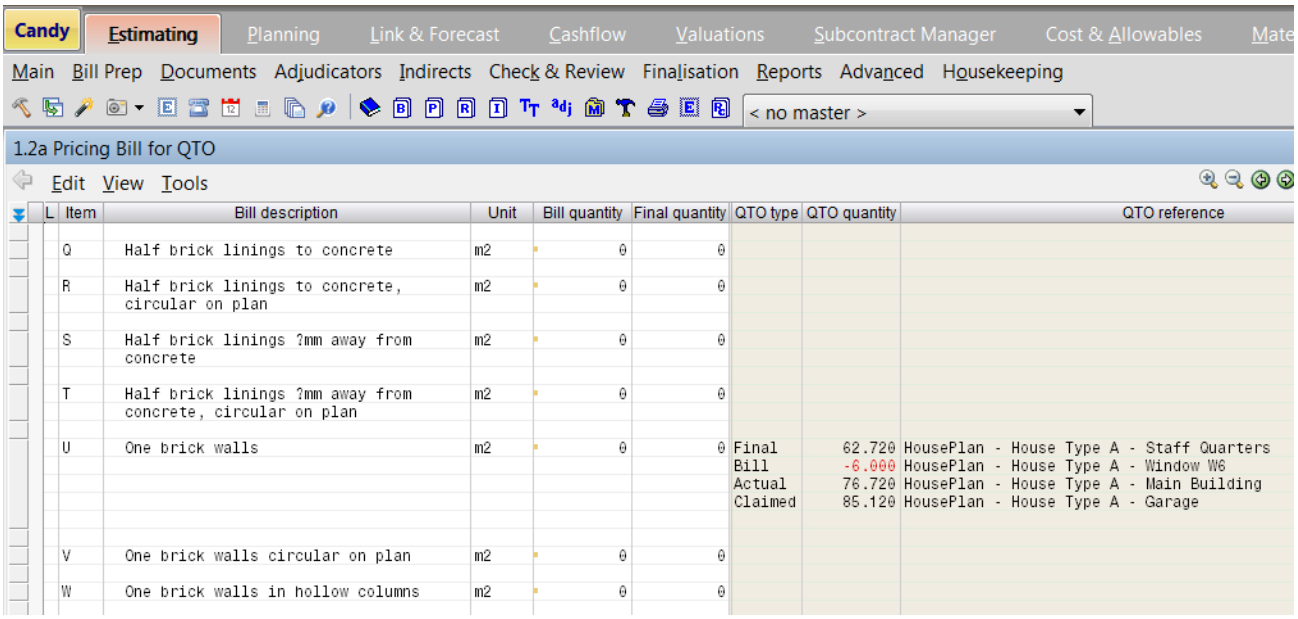
This is a no entry field and displays the final variable value.

Updating the Bill of Quantities in Candy

When the measure is complete, the QTO quantities can be synchronised with the Bill of Quantities by right-clicking on the selected file and using *“Copy Quantities from QTO”*.



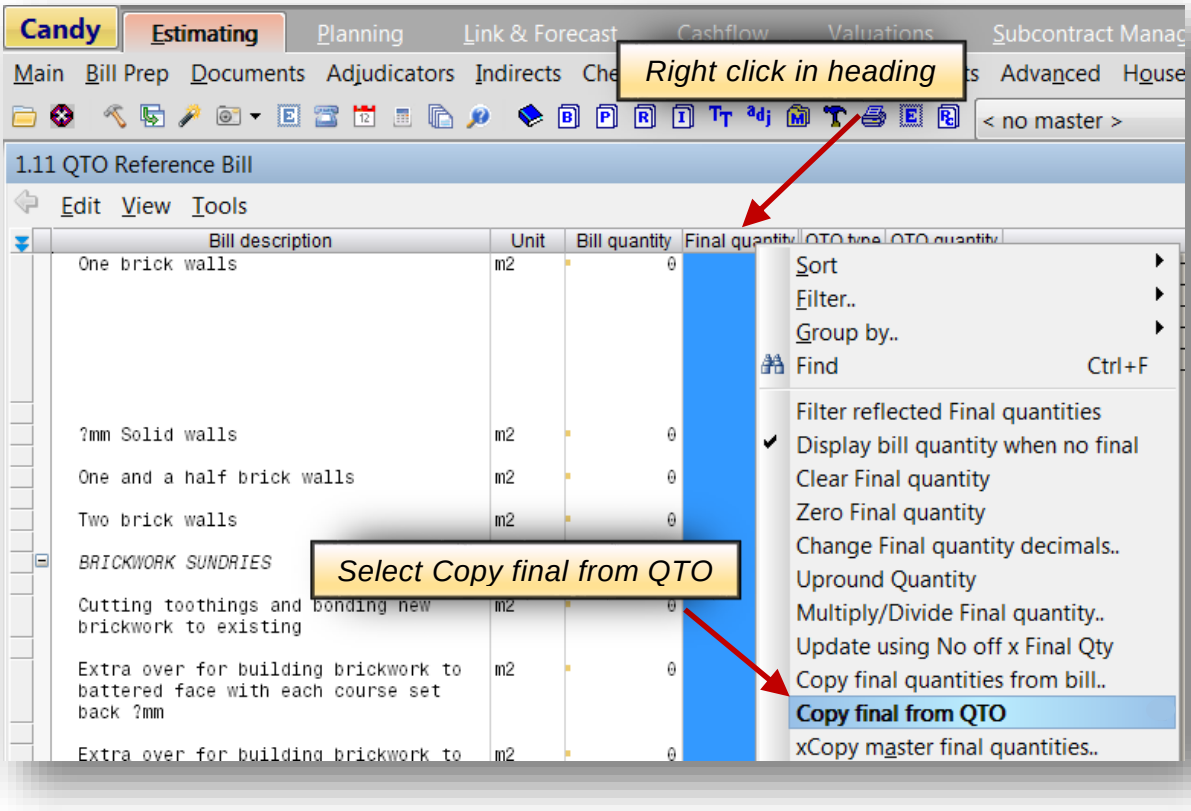
After this process all the QTO take-offs are visible in the Bill of Quantities stating the QTO type, QTO quantity, drawing, Measure folder and take-off references.



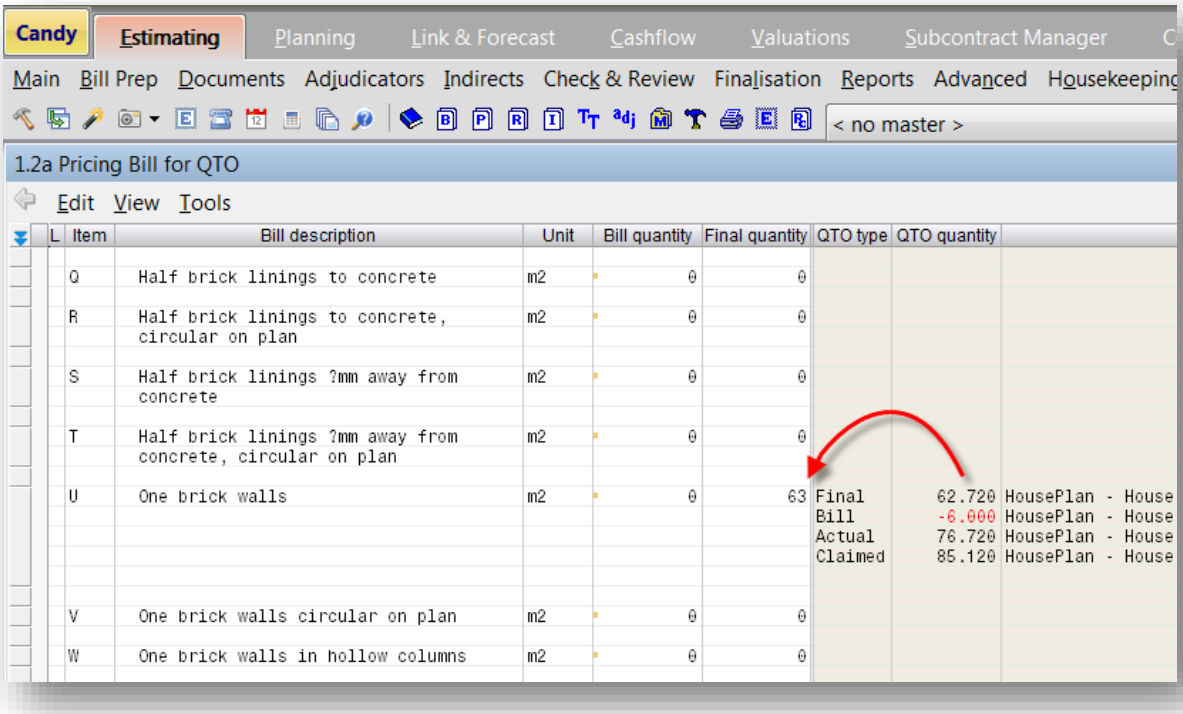
L	Item	Bill description	Unit	Bill quantity	Final quantity	QTO type	QTO quantity	QTO reference
	Q	Half brick linings to concrete	m2	0	0			
	R	Half brick linings to concrete, circular on plan	m2	0	0			
	S	Half brick linings ?mm away from concrete	m2	0	0			
	T	Half brick linings ?mm away from concrete, circular on plan	m2	0	0			
	U	One brick walls	m2	0	0	Final	62.720	HousePlan - House Type A - Staff Quarters
						Bill	-6.000	HousePlan - House Type A - Window W6
						Actual	76.720	HousePlan - House Type A - Main Building
						Claimed	85.120	HousePlan - House Type A - Garage
	V	One brick walls circular on plan	m2	0	0			
	W	One brick walls in hollow columns	m2	0	0			

The quantities can then be copied into the relevant columns in the Bill of Quantities.

In this example the Final Quantity is copied into the Bill of Quantities by right-click in the column heading *"Final Quantity"* and selecting, *"Copy Final from QTO"*.



On the screen-shot below, only the take-off marked Final is transferred.

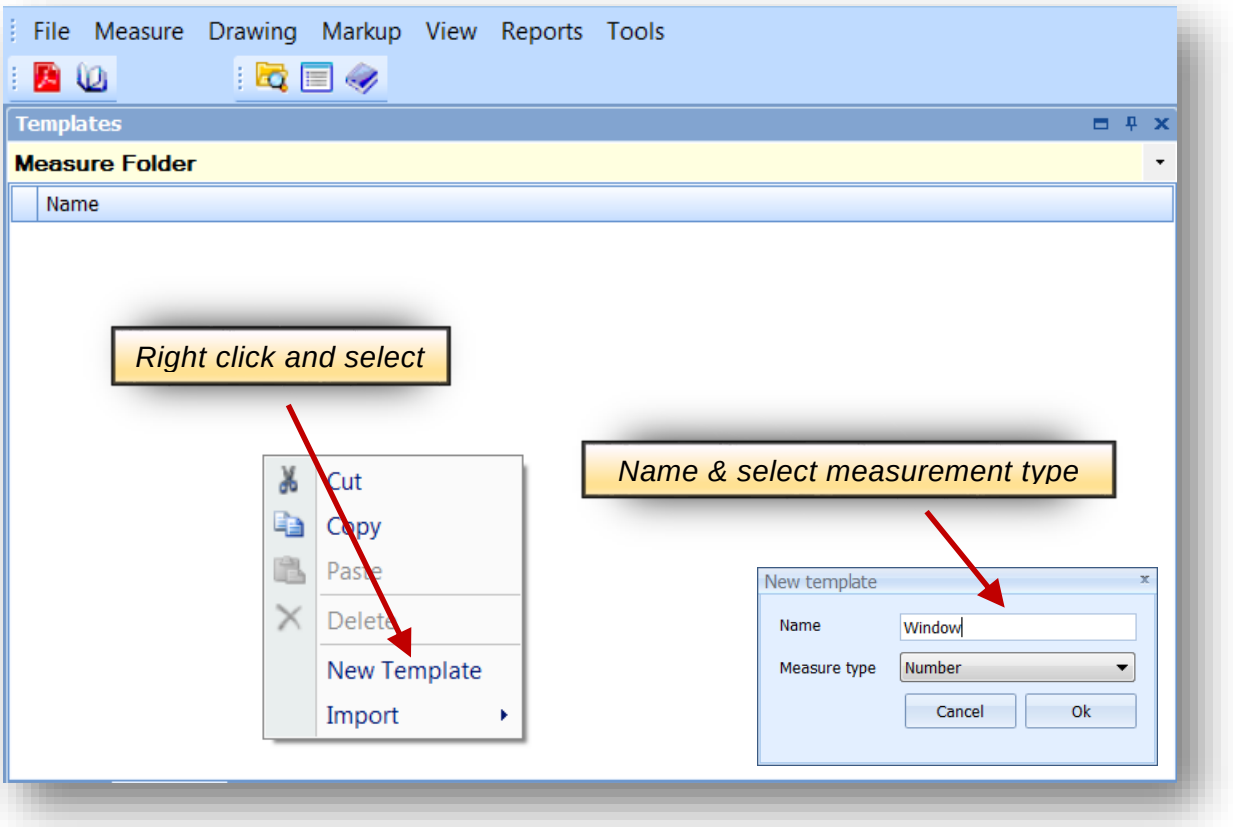


Templates

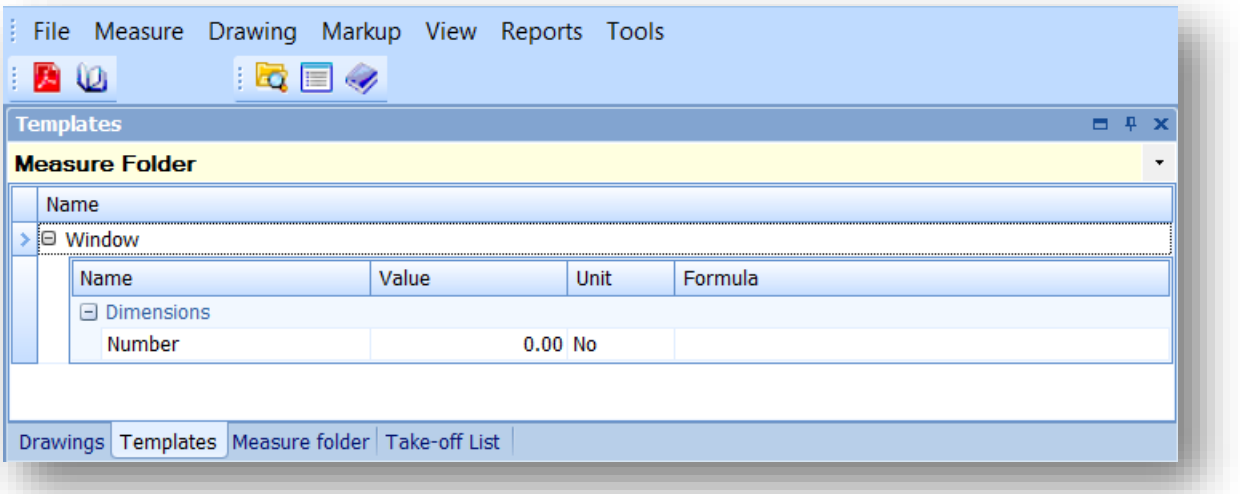
The most efficient way to measure the job is to make use of job templates. Templates can be created to include variables, formulae and Bill of Quantity items which will be needed many times to measure the job.

Create a Template

To create a new template select the Template tab, right-click and choose "*New Template*" then name the template and select the Measurement type as below.

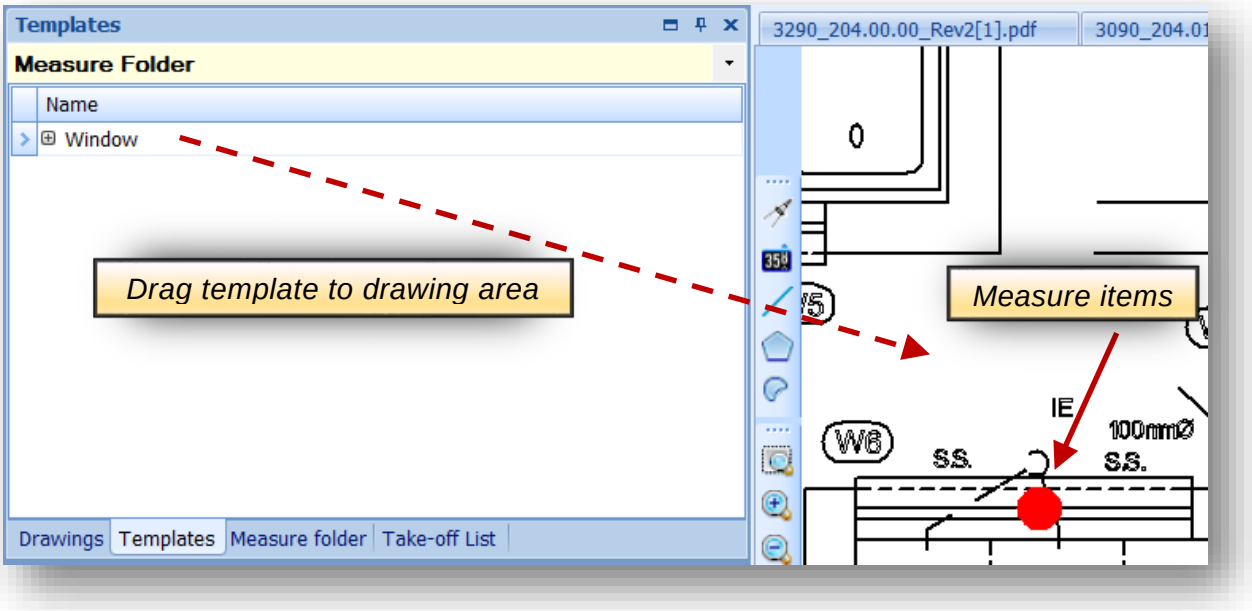


Once complete, the template is recorded in the template directory. When the new template is accessed, a blank template will be displayed as per picture below. The template is now ready to be populated with variables, formulae and Bill of Quantity items. Refer to the relevant section for helps on these.



Measuring from the Template

To measure from a template, drag the template name onto the drawing and then continue the measure as described previously. When the measurement is complete go to the Take-off tab where the measurement is recorded and all quantities will have been updated. The default name on the take-off list will be the name of the Template that was used, it is important to change the name of this take-off to identify where the measurement came from.



Using Templates

The use of templates will save time as it eliminates all the preparation work for repetitive type measurements.

Typical examples of templates:

- Internal Perimeter - including all Bill of Quantity items that require a perimeter measure, a good tip is to select the Area type for this template, as this will also give the internal perimeter and by the use of formula in variables, the centre line and external perimeters can be used.

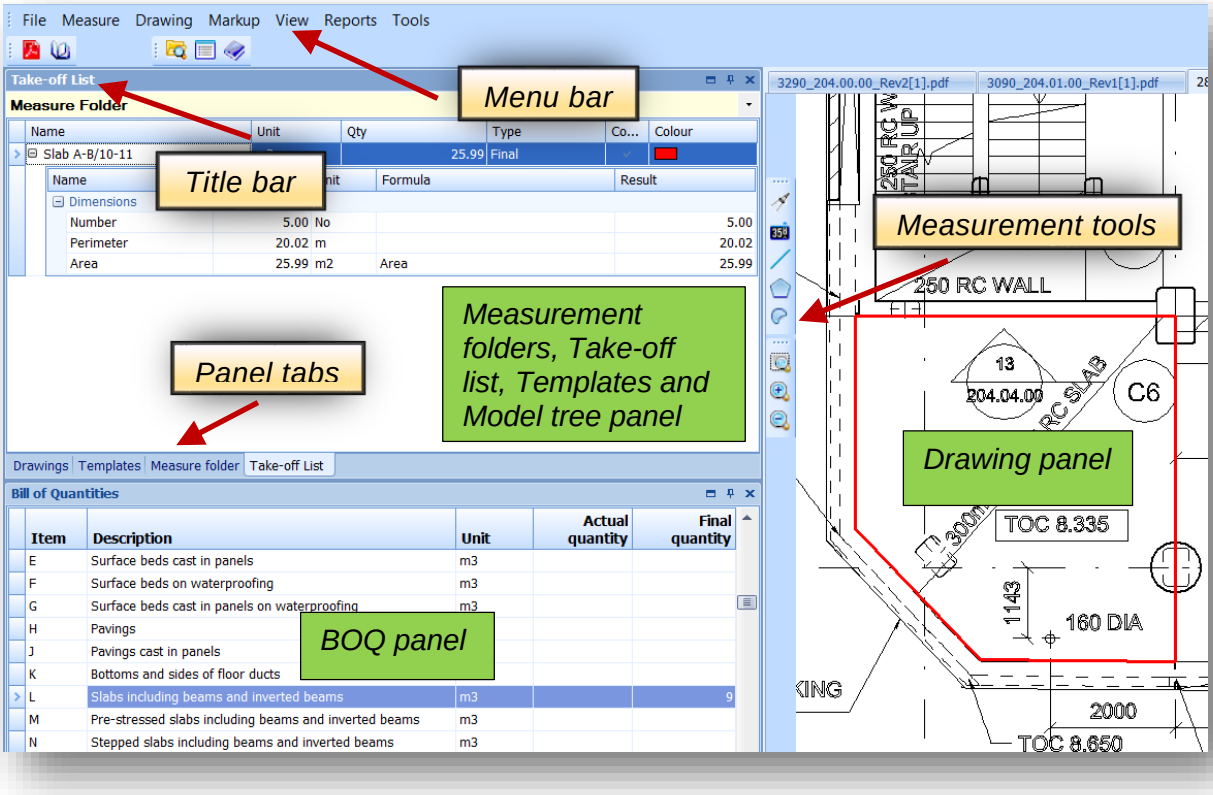
- Window - including all Bill of Quantity items that will be affected by the installation of a window. The Number type would be selected, counting the Window type and with the use of variables, deductions for external walling, internal and external finishes are made and items such as lintols, reveals, cavity closers, cills can be attached.

- Door - including all Bill of Quantity items that will be affected by the installation of a door. The Number type would be selected, counting the Door type and with the use of variables, deductions for walling, internal and external finishes are made and items such as frames, ironmongery, lintols, reveals, cavity closers can be attached.

- Downstand Beam - The linear tool would be selected, and with variables will measure the concrete volume, formwork to the sides and soffit of beams and make deduction for the formwork to soffit of slabs.

Customising the Display

The default screen displays three panels but can be customised.



Floating Panels

Any panel can be undocked from the default location and moved anywhere on the desktop or to another monitor. Multiple panels can be docked together in a “raft” and then moved as a unit anywhere on the desktop or to another monitor.

To position a panel outside the main window

- Double-click the title bar of the panel and drag the panel to the required location

To return a panel to its most recent docked location

- Press CTRL while and Double-click the title bar of the panel.

Note: The drawing display area will not float.

Docking Panels

The panels are fastened and tabbed to the left hand side of the main window by default. The guide diamond appears when the panel is dragged to another location. The guide diamond, pictured below, is a visual assistance to re-dock the panel.

To dock a panel

1. Click on the panel
2. Drag the window toward the middle of the main window
3. The guide diamond appears. The four arrows of the diamond point toward the four sides of the pane
4. When the panel reaches the required location, move the pointer over the corresponding portion of the guide diamond. The designated area will be shaded
5. To dock the panel in the position indicated, release the mouse button
6. Alternatively, a panel can be docked to a portion of one of the side walls of the main window. Drag the panel to the side until a secondary guide diamond appears. Click one of the four arrows to dock the tool window to that portion of the side wall

Auto hide panels

The pushpin icon resembles the following graphic when Auto Hide is enabled.

Auto Hide Disabled
Auto Hide Enabled

Rest panels

Tools>Layout>Reset Layout

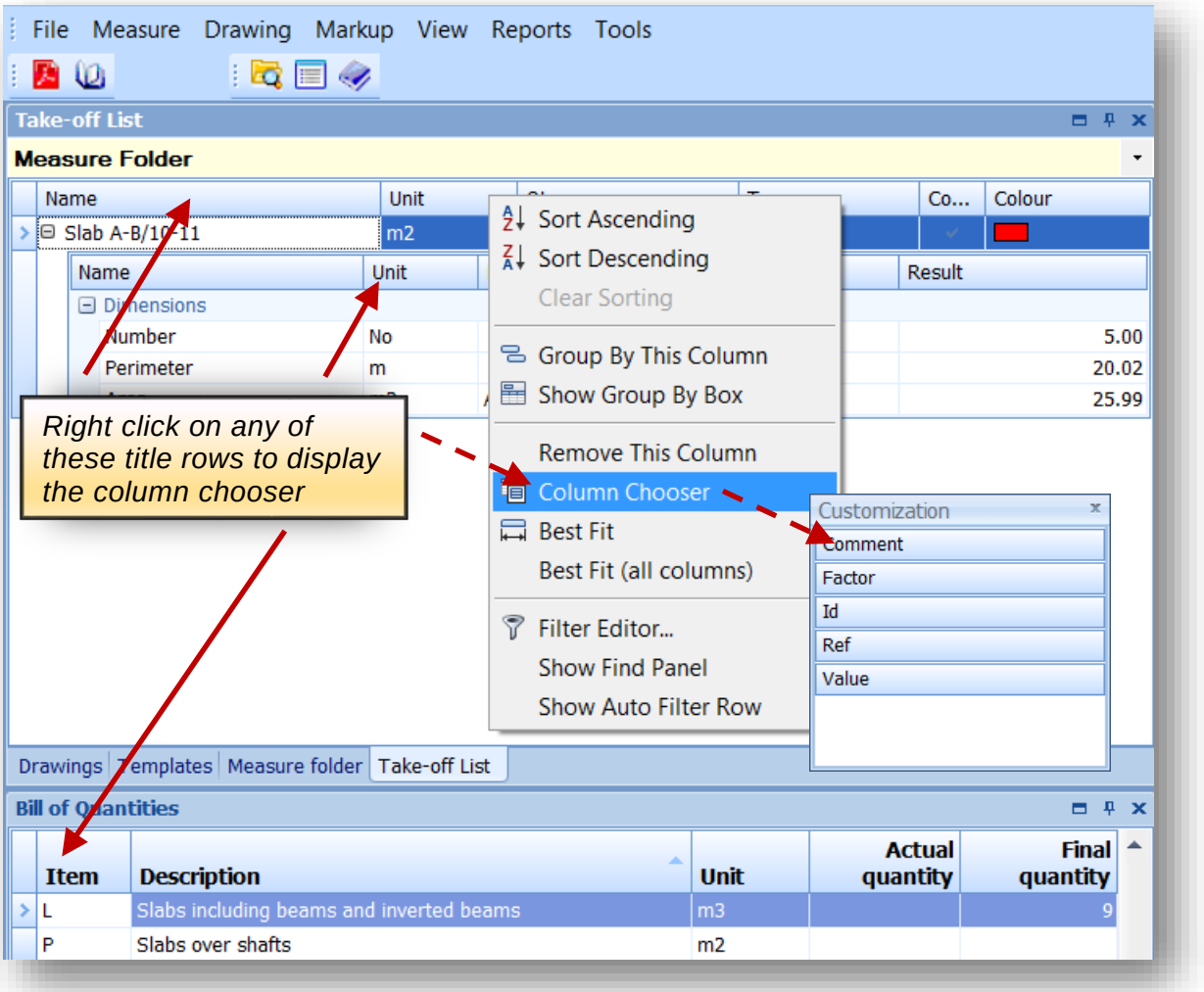
Each panel can be separated and moved around the screen to customise the interface layout. Click and drag the panel tab, will move the panel onto any of the layout options. Interface layouts can then be saved, closed, and restored.

Multiple monitors

It is preferable but not mandatory that two or more monitors are used. The drawing panel must reside on the primary monitor but all other panels can be moved. Place the cursor on the Title Bar and drag to move the panel to a position on another monitor.

Column Chooser

The column chooser is an option to customise specific columns. Add or remove columns temporarily depending on the requirement. The Column chooser is available on Bill and Take-off headers. To access Column Chooser, right-click on the header.



When the column chooser is open, drag & drop the required columns into position. Columns are removed from the display by drag and drop into the "*Customisation*" panel below.

Revised Drawings

When a revised drawing is issued, it is not necessary to start the measurement process from the beginning.

The following steps should be taken to update measurements of the revised drawing using the procedures explained previously:

1. Attach the revised drawing.
2. Calibrate the drawing.
3. Open the original drawing.
4. Select the **Take-Off List** tab.
5. With the cursor selecting the take-off to be revised, Right Click and **Copy.** Multiple Take-offs can also be selected.
6. Open the revised drawing.
7. Select the **Take-Off List** tab, **Right Click** and **Paste**.

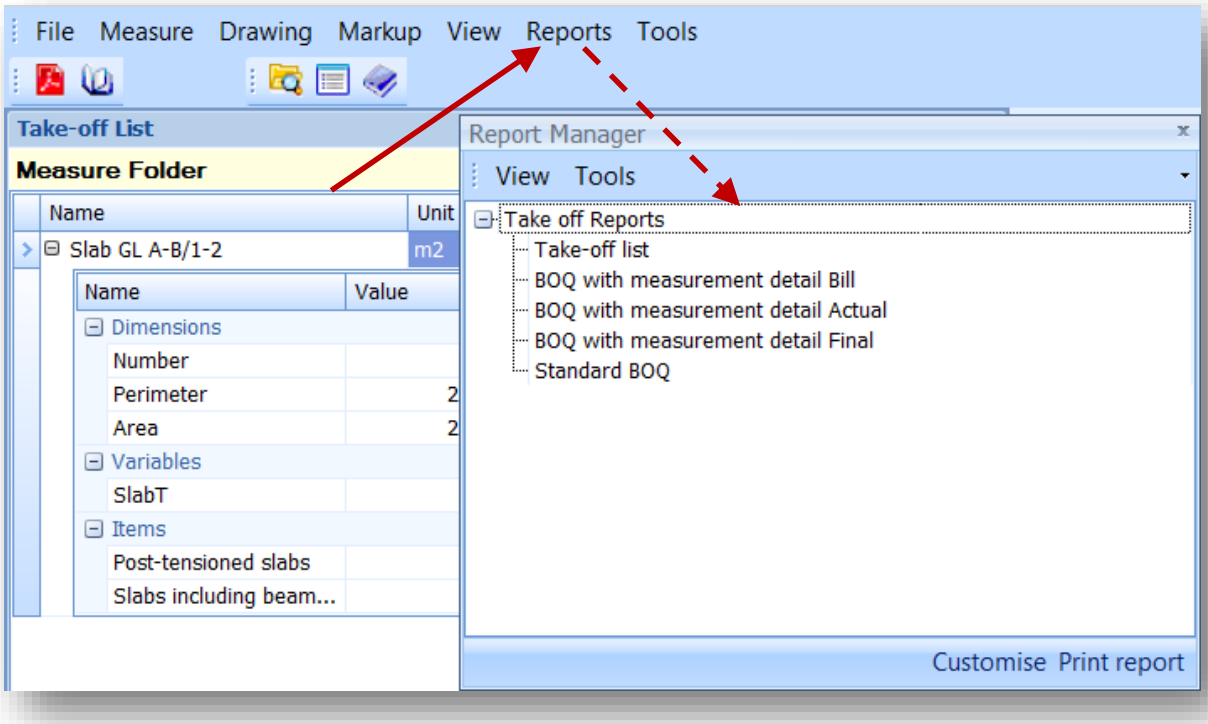
The original Mark-Up is now visible on the revised drawing and can now be revised to match the revised layout.

As explained above, the take-off can be revised by using the “**Continue**” button or adding, deleting and moving the Grip Points.

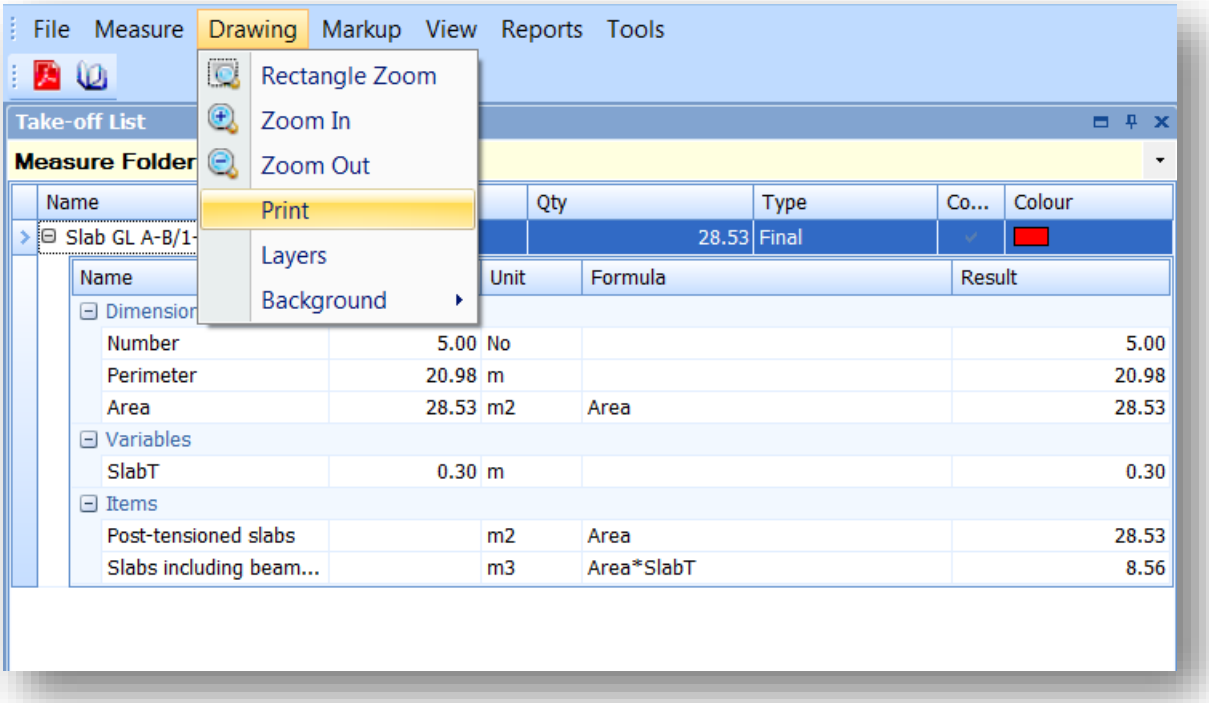
To prevent any duplication, once the Mark-Up on the revised drawing has been successfully updated, open the original drawing, select the **Take-Off List** and delete the original Take-Off.

Reports

By selecting the **Report** tab on the menu bar, there will be a drop down box which allows a variety of reports to be selected.



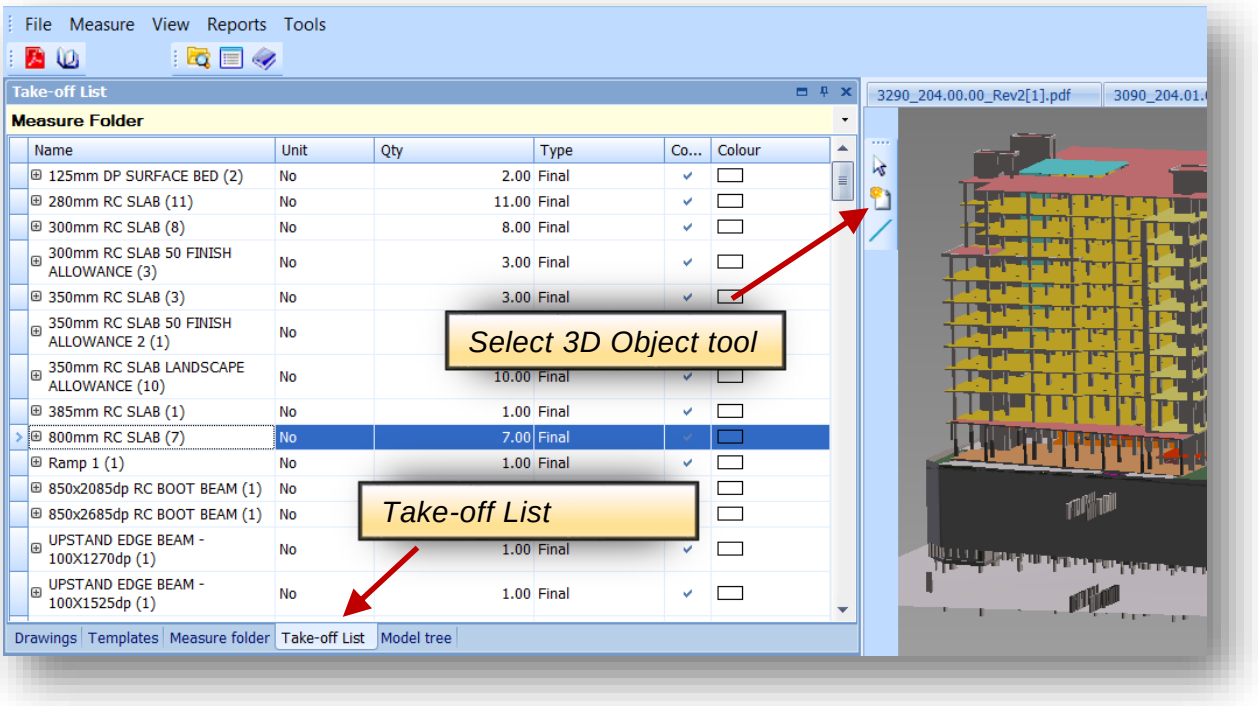
Drawings with mark-up can also be printed by selecting the drawing tab and then print as shown below.



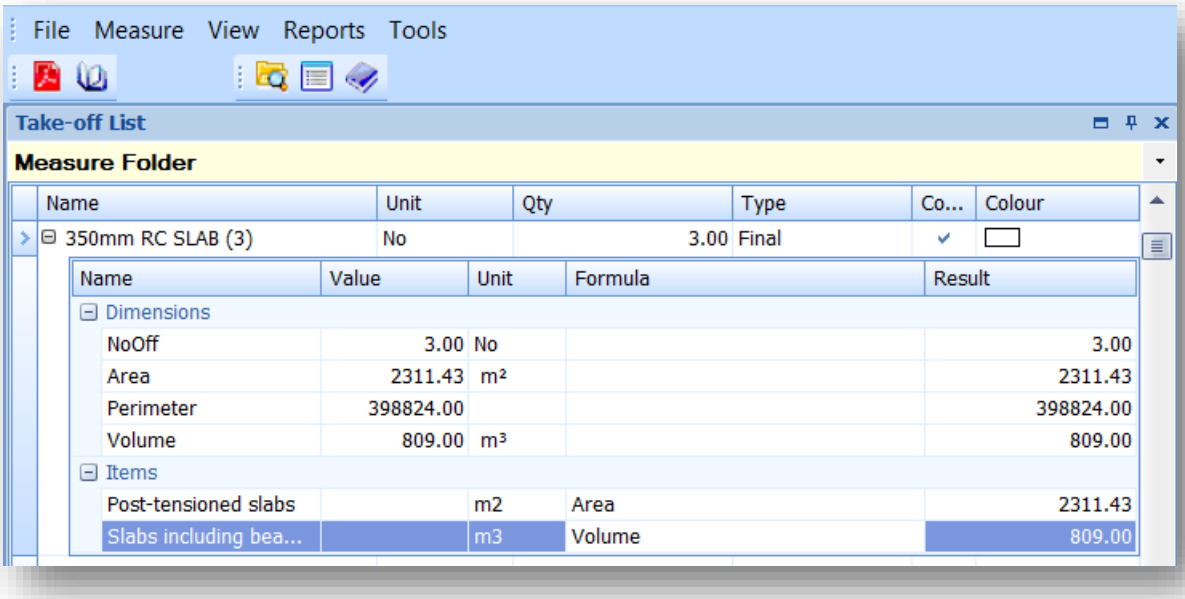
Measurement in 3D format

Measurement of 3D drawings using QTO is very simple using the following procedure:

1. Attach the drawing to the QTO file as described above.
2. Select the **3D Object** tool to create the Take-off list. Select an item in the Take-off list and allocate the Bill items to it in exactly the same manner as in 2D take-off.


File Measure View Reports Tools
Take-off List
Measure Folder
Name Unit Qty Type Co... Colour
125mm DP SURFACE BED (2) No 2.00 Final
280mm RC SLAB (11) No 11.00 Final
300mm RC SLAB (8) No 8.00 Final
300mm RC SLAB 50 FINISH ALLOWANCE (3) No 3.00 Final
350mm RC SLAB (3) No 3.00 Final
350mm RC SLAB 50 FINISH ALLOWANCE 2 (1) No
350mm RC SLAB LANDSCAPE ALLOWANCE (10) No 10.00 Final
385mm RC SLAB (1) No 1.00 Final
800mm RC SLAB (7) No 7.00 Final
Ramp 1 (1) No 1.00 Final
850x2085dp RC BOOT BEAM (1) No
850x2685dp RC BOOT BEAM (1) No
UPSTAND EDGE BEAM - 100X1270dp (1) No 1.00 Final
UPSTAND EDGE BEAM - 100X1525dp (1) No 1.00 Final
Drawings Templates Measure folder Take-off List Model tree
3290_204.00.00_Rev2[1].pdf
Select 3D Object tool
Take-off List

3. Add any variables or formulae as necessary as would be done in 2D take-off.



3D Models have far more information within the drawing than a 2D drawing, it is for this reason that we are able to make 3D take-off so simple. There is no need for **Measurement Folders** as the Model Tree lists all the elements of the 3D model.

3D Drawing Menu

To navigate around and through the 3D Drawing, Right Click on the drawing panel and it will bring up the 3D drawing menu.